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GGSIPU chamistry 2014

1. The molecular ion X F^-_2 has three pairs of non-bonding electrons around the central atom. The bond angle F-X-F will be closest to

 (a) 180^0 (b) 120^0

 (c) 109^0 (d) 90^0

2. Which of the following sets have correctly matched each molecule or ion and its geometry?

	Tetrahedral	Triogonal Pyramidal	T-shaped	Square planar
(a)	CH_4	BCl_3	NO^-_3	SO^{2-}_4
(b)	SO^{2-}_4	NF_3	ICl_3	XeF_4
(c)	CH_4	NO_3^-	GaL_3	$SnCL_4$
(d)	CCL_4	PF_3	ICl_3	SF_4

3. Ethanol is CH_3CH_2OH. Which species is formed when ethanol acts as a Bronstead base?

 (a) $CH_3CH_2O^-$

 (b) $CH_3CH^+_2$

 (c) $CH_3CH_2OH^+_2$

 (d) H_3O^+

4. Which of the following salts has the greatest molar solubility in pure water?

 (a) $CaCO_3$ ($K_{sp} = 8.7x10^{-9}$)

 (b) CuS ($K_{sp} = 8.5x10^{-45}$)

 (c) Ag_2CO_3 ($K_{sp} = 6.2x10^{-12}$)

 (d) Pb_9IO_3 ($K_{sp} = 2.6x10^{-13}$)

5. The number of valence-shell bonding electron-dot model for HNNN is

 (a) 6 (b) 10 (c) 11 (d) 16

6. Which of the following pairs contains isoelectronic species?

 (a) Be and Li^+ (b) P^+ and S^-

 (c) N^{2-} and Ne (d) O^{2-} and Na^+

7. Which of the following sets has the atoms and/or ions in correct order of increasing size?

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(a) $Ne<F^{-}<O^{2-}$

(b) $Br^{-}<CL^{-}<F^{-}$

(c) $Na^{+}<Mg^{2+}<AL^{3+}$

(d) P<S<CL

8. For which of the following equations is the change in enthalpy at $25^{0}C$ and 1 atm equal to aH^{o}_{f} of $CH_2O(l)$

(a) $C(g) + H_2(g) + (1/2)O_2(g) \rightarrow CH_2O(l)$

(b) $C(s) + H_2(g) + (1/2)O_2(g) \rightarrow CH_2O(l)$

(c) $C(g) + 2\ H_2(g) + O(g) \rightarrow CH_2O(l)$

(d) $CO(g) + 2\ H_2(g) \rightarrow CH_2O(l)$

9. CL_2O is a yellowish-red gas at room temperature. The strongest intermolecular forces present in CL_2O are

(a) dipole-dipole forces

(b) London forces

(c) hydrogen bonds

(d) covalent bonds

10. An ammonia solution has a density of 0.910 g cm^{-3} and is 25.0% NH_3 by mass. What is the molarity of the solution?

(a) 12.1 M (b) 13.4 M (c) 14.5 M (d) 15.5 M

11. A compound X_2O_3 contains 31.58% oxygen by weight. The atomic weight of X is

(a) 34.66 g/mol (b) 45.01 g/mol

(c) 52.00 g/mol (d) 104.0 g/mol

12. What is the concentration of a solution prepared by dissolving 4.20 of NaF in 500 g of water?

(a) 0.200-molal (b) 0.200-molar

(c) 0.00840-molal (d) 0.00840-molar

13. In the van der Walls, equation given below, $[p+a(n/V)^2](V-nb) = nRT$, the $a(n/V)^2$ and –nb terms represent, respectively, corrections for

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(a) derivations in the pressure and the temperature

(b) intermolecular attractive forces and molecular volumes

(c) intermolecular attractive forces and inelastic collisions

(d) intermolecular repulsive forces and high temperature

14. Find the boiling point of a solution of 5.00 g of naphthalene($C_{10}H_8$) in 100 g of benzene. K_b of benzene if 2.53^0 C/m; the normal boiling point of benzene = 80^0C.

(a) 81^0C (b) 85^0C

(c) 0.99^0C (d) 79^0C

15. Magnesium fluoride is a slightly soluble salt whose solubility product constant is $K_{sp} = 3.7x10^{-8}$. What is the approximate solubility of magnesium fluoride?

(a) $9.2x10^{-9}$ M (b) $1.2x10^{-8}$ M

(c) $1.4x10^{-4}$ M (d) $2.1x10^{-3}$ M

16. The distribution coefficient, K_D for an organic compound between water and methylene chloride is 3.40. An aqueous solution of the organic compound contains 0.500 g per 100 mL and is extracted with 50.0 mL of methylene chloride. What percentage of the organic compound originally in water is extracted?

(a) 31.5% (b) 63.0%

(c) 72.0% (d) 92.6%

17. The permanganate ion is an excellence oxidisting agent in aqueous solutions. When the half reaction, $MnO^-_4 + H^+ + e^- \rightarrow MnO_2 + H_2O$ is balanced, the correct coefficients for the species involved are

(a) 1,4,4,1,2 (b) 1,4,2,1,2

(b) 1,4,3,1,2 (d) 1,4,1,1,2

18. For a certain reaction the rate law is rate = $k[C]^{3/2}$. If the rate of the reaction is 0.020 mol $L^{-1}s^{-1}$ when [C] = 1.0 M, what is the rate when [C] = 0.60 M?

(a) 0.0093 mol $L^{-1}s^{-1}$ (b) 0.012 mol L^{-1} s^{-1}

(b) 0.033 mol L^{-1} s^{-1} (d) 0.040 mol L^{-1} s^{-1}

19. Which atom has the correct ground state electron configuration?

(a) Cl : $[Ne]3s^1$ $3p^6$ (b) Mo : $[Kr]5s^14d^5$

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(c) Cu : $[Ar]4s^2 3d^6$ (d) As : $[Ar]4s^2 4d^{10} 4p^3$

20. What is the volume,in liters,of 576 g of SO_2 gas at STP?

(a) 101 (b) 202

(c) 216 (d) 788

21. A 2.0 molal sugar solution has approximately the same freezing point as a, 1.0 molal solution of

(a) $CaCL_2$ (b) CH_2COOH

(c) C_2H_5OH (d) NaCL

22. Cellulose,protein and starch are classified as

(a) natural polymers (b) aldehydes

(c) esters (d) synthetic polymers

23. An example of a secondary alcohol is

(a) 1-propanol (b) 2-propanol

(c) 1,2-propanol (d) 1,2,3 propanol

24. The IUPAC name of compound $CH_2 = CH(CH_3)_2$ is

(a) 1,1-dimethyl-2-propane

(b) 2-vinyl propane

(c) 3-methyl-1-butene

(d) 2-vinyl propane

25. The number of sigma and pi-bonds in 1-butene 3-yne are

(a) 6 sigma and 4 pi (b) 7 sigma and 3 pi

(c) 5 sigma and 5 pi (d) None of these

26. Geometrically isomerism is reflected by which of the compound ?

(a) 3-phenyl-1-butene

(b) 2-phenyl-1-butene

(c) 1,1-diphenyl-1-propane

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(d) 1-phenyl-2-butene

27. Which of the compound does not dissolve in concentrated H_2SO_4?

(a) Hexane (b) Benzene

(c) Ethylene (d) Aniline

28. Given the K_{sp} expression. $K_{sp} = [A^{3+}]^2[B^{2-}]^3$

(a) $A_2B_3(s) \Leftrightarrow 3A^{3+}(aq) + 2B^{2-}(aq)$

(b) $A_2B_3(s) \Leftrightarrow 3A^{3+}(aq) + 3B^{2-}(aq)$

(c) $A_3B_2(s) \Leftrightarrow 3A^{3+}(aq) + 2B^{2-}(aq)$

(d) $A_3B_2(s) \Leftrightarrow 2A^{3+}(aq) + 3B^{2-}(aq)$

29. Black precipitate from in many metal ion solutions when which anion is used as a precipitating agent?

(a) Cl^- (b) S^{2-}

(c) PO^{3-}_4 (d) CO^{2-}_3

30. What is the oxidation number of Pt in $K[PtNH_3Cl_5]$?

(a) 0 (b) +1

(c) +2 (d) +4

31. Which substance has the lowest boiling point?

(a) $CH_3CH_2CH_2CH_2OCH_3$

(b) $CH_3CH_2OCH_2CH_3$

(c) $CH_3CH_2CH_2CH_3$

(d) $CH_3CH_2C = OCH_3$

32. Elemental analysis results obtained for cortisone, an anti-inflammatory agent, are 69.98% C, 7.83% H and 22.19% O.What is the empirical formula of cortisone?

(a) C_4H_6O (b) $C_{18}H_{22}O_3$

(c) $C_{20}H_{25}O_4$ (d) $C_{12}H_{28}O_5$

33. Which pairs of compounds will form the strongest hydrogen bonds with each other?

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(a) C_2H_5OH and CH_3OCH_3

(b) $HOCH_2CH_2OH$ and H_2O

(c) $HOCH_2CH_2OH$ and CH_3OH

(d) CH_3OCH_3 and H_2O

34. Which of the following acids dissociates to the greatest extent in a aqueous solution?

(a) Tricloroacetic acid (b) Acetic acid

(c) Chloroacetic acid (d) Dichloracetic acid

35. What is one of the products of the addition of HBr to 2 butene?

(a) 1-bromobutene (b) 2-bromobutene

(c) 1,2-dibromobutene (d) 2,3-dibromobutene

36. The anti-cancer drug cis-platin has the formula $Pt(NH_3)_2CL_2$. There is another isomer, trans-platin, that is not medically active. What is the shape of cis-platin?

(a) Tetrahedral (b) Octahedral

(c) square planar (d) Trigonal bipyramidal

37. Aluminium hydroxide, $Al(OH)_3$, is insoluble in water, but dissolves readily in both acidic and basic solutions. Such behavior is characteristic of

(a) polyprotic behavior (b) hydrophilic behavior

(c) a buffer (d) amphoteric behavior

38. How many of the following salts will be more soluble in acid solution than in pure water? $CdCO_3$, $Mn(OH)_2$, PbS,$PbCl_2$

(a) 1 (b) 2 (c) 3 (d) 4

39. Which of t6he following substances has the highest melting point?

(a) CaO (b) $BiCl_3$ (c) KCL (d) CLO_2

40. Which of the following oxides, at the same concentration when dissolved in water,results in the most acidic solutions?

(a) CO_2 (b) B_2O_3

(c) N_2O_5 (d) Li_2O_2

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41. What is the ground state electron configuration of the Mn^{2+} ion?

(a) $[Ar]4s^1 3d^5$ (b) $[Ar]4s^2 3d^3$

(c) $[Ar]3d^5$ (d) $[Ar]3d^4$

42. In spontaneous beta paticle ($^-$) emission, what is the source of the emitted electron?

(a) The nucleus

(b) The 1s orbital

(c) The outermost occupied orbital

(d) A random orbital

43. Very strong acids, such as HNO_3 and HCL, appear to be equally strong in water. This "leaving effect" of bwater because

(a) OH^- is a stronger base than the conjugate bases of HNO_3 and HCL

(b) H_3O^+ is a stronger acid than HNO_3 and HCL

(c) H_2O is a stronger base than the conjugate bases of HNO_3 and HCL

(d) H_2O is a weaker base than the conjugate bases of HNO_3 and HCL

44. Which factors do not effect the vapour pressure of a liquid at equilibrium ?

I. Intermolecular forces of attraction

II. The volume of liquid present

III. The temperature of the liquid.

(a) Only I (b) Only II

(c) I and II (d) II and III

45. The half-life of ^{14}C is 5570 yr. How many years will it take for 90% of a sample to decompose?

(a) 5.570 yr (b) 17,700 yr

(c) 18,600 yr (d) 50,100 yr

46. Which atom is the smallest?

(a) Rb (b) Ag

(c) Sb (d) I

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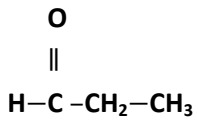
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47. Which of the anhydride of nitric acid?

(a) NO (b) NO_2

(c) N_2O_3 (d) N_2O_5

48. What type of compound is shown in below?



(a) An alcohol (b) An aldehyde

(c) A ketone (d) None of these

49. Hydrogen bonding is maximum in

(a) diethyl ether (b) triethyl amine

(c) ethanol (d) None of these

50. Benzyl chloride ($C_6H_5CH_2CL$) can be prepared from toluene by chlorination with

(a) CL_2 (b) SO_2CL_2

(c) $SOCL_2$ (d) NaOCL

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